TECHNICAL UNIVERSITY OF LISBON

Faculty of Veterinary Medicine

Hyperthyroidism in Cats: a review of cases seen at a first opinion veterinary hospital practice in the UK

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JURY

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RESUMO

Este trabalho é constituído por um estudo retrospectivo e um estudo prospectivo da população de gatos hipertiroideus do hospital veterinário Wylie Veterinary Centre, no Reino Unido,

Foi feito um estudo retrospectivo dos 266 casos apresentados no Wylie Veterinary Centre entre 1/8/07 e 31/7/09, com o objectivo de caracterizar a população e avaliar a eficácia e segurança das várias opções terapêuticas. As opções terapêuticas foram tiroidectomia e terapêutica médica com Neo-mercazole® (carbimazol), Felimazole® (metimazol), metimazol líquido e Vidalta® (carbimazol de libertação contínua). Metimazol líquido foi a opção mais eficaz, controlando 69.2% dos casos. Por não se encontrar disponível, a opção disponível mais eficaz é a tiroidectomia unilateral, com 69% de casos controlados. Neo-mercazole® e metimazol líquido constituem as opções mais seguras, não tendo registado quaisquer reacções adversas. Contudo, por já não estarem disponíveis, a opção disponível mais segura é a tiroidectomia unilateral, com apenas 4,8% de complicações. Comparando as opções terapêuticas médicas disponíveis, Vidalta® parece ser o mais eficaz, com 54,9% dos casos controlados e Felimazole® o mais seguro, com 5,13% de reacções adversas. Comparando os custos das opções terapêuticas, a terapêutica médica requer um menor investimento inicial. A tiroidectomia parece ser a mais económica a longo prazo, correspondendo ao custo de um ano de terapêutica médica e a metade do preço de tratamento com iodo radioactivo.

Foi feito um estudo prospectivo dos 77 gatos hipertiroideus apresentados num período de 3 meses. A população foi caracterizada e foi determinada a frequência dos sinais clínicos, alterações hematológicas e bioquímicas, bem como os resultados obtidos com as terapêuticas médica e cirúrgica. As tiróides extirpadas foram submetidas a análise histopatológica. A média de idades da população foi de 14 anos. Foram diagnosticados 18 novos casos, o que corresponde a 6 novos casos por mês. Todos os casos apresentaram perda de peso. A frequência de ocorrência de diarreia, dispneia, sopros cardíacos, PU/PD, lesões cutâneas e vómitos foi acentuadamente mais baixa que a descrita na bibliografia, bem como a frequência de eritrocitose, elevação das enzimas hepáticas e hiperfosfatémia. A frequência de azotémicos foi superior à descrita na literatura e ocorreu azotémia *de novo* em 15,6% dos casos. Houve efeitos secundários à terapêutica em 23,38% dos casos. A doença concomitante mais frequente foi a patologia dentária e o meio de diagnóstico complementar mais utilizado foi a ecocardiografia. A única morte devida a uma complicação pós-cirúrgica ocorreu após uma tiroidectomia bilateral não faseada. Em 2 das 7 tiroidectomias não foi possível preservar o aporte sanguíneo da paratiroide. 3 das 7 glândulas analisadas apresentaram carcinomas.

Palavras-chave: Hipertiroidismo felino, tiroxina, carbimazol, metimazol, tiroidectomia, iodo radiactivo.

ABSTRACT

This thesis is constituted by one retrospective study and one prospective study of the hyperthyroid cat population of the Wylie Veterinary Centre.

The retrospective study was based on 266 hyperthyroid cats presented in the practice from 1/8/07 to 31/7/09, with the objective of characterizing the population and evaluating the efficacy and safety of the different therapeutic options. The therapeutic options were surgery and medical therapy with Neo-mercazole® (carbimazole), Felimazole® (methimazole), methimazole liquid and Vidalta® (sustained release carbimazole). Methimazole liquid was the most effective option, controlling 69,2% of the cases. Because it is no longer available, the most effective available option is the unilateral thyroidectomy, with 69% of controlled cases. Neo-mercazole® and methimazole liquid were the safest options, without causing adverse reactions. However, because they are no longer available, the safest option is probably the unilateral thyroidectomiy, with only 4,8% of complications. Comparing the available medical options, Vidalta® seems to be the most effective, with 54,9% of controlled cases, and Felimazole® the safest, causing adverse reactions in 5,13% of the cases. Comparing the costs of the different treatment options, medical therapy requires a lower initial investment, but thyroidectomy seems to be the most economical long-term option, corresponding to a one-year course of medical treatment and to half the price of radioiodine therapy.

The prospective study involves the 77 hyperthyroid cats seen in a period of 3 months. The population was characterized, the frequency of the clinical signs, hematologic and biochemical changes was determined, as well as the outcome of medical and surgical therapy and the involvement of the parathyroid in surgery. The extracted thyroid glands and submitted to histopathology. The population had a mean of 14 years of age. 18 new cases were diagnosed, corresponding to 6 new hyperthyroid cats per month. All cats presented weight loss. The frequency of diarrhoea, dyspnoea, heart murmur, PU/PD, skin lesions and vomiting was much lower than described the in literature, as well as the frequency of erythrocytosis, increased liver enzymes and hyperphosphatemia. Azotemia had a higher frequency than described in the literature and *de novo* azotemia happened after treatment in 15,6% of the cases. The incidence of side effects of treatment was 23,38%. The most frequent concomitant disease was dental disease and the most common diagnostic complementary exam was echocardiography. The only patient that died of a complication from surgery was submitted to a simultaneous bilateral surgery. In 2 of the 7 thyroidectomies the parathyroid's blood supply was not preserved. Thyroid carcinoma was found in 3 of the 7 analysed glands.

Keywords: Feline hyperthyroidism, thyroxine, carbimazole, methimazole, thyroidectomy, radioactive iodine.

GENERAL INDEX

INDEX OF PICTURES

INDEX OF TABLES

Annexes:

INDEX OF GRAPHICS

INDEX OF ABBREVIATIONS AND SYMBOLS

%: Percentage
131I: Iodine-131, radioiodine
123I: Iodine-123
α: Alfa
β: Beta
γ: Gama
μCI: microcurie
ACEI: angiotensin-converting enzyme inhibitors
ALP: Alkanine Phosphatase
ALT: Alanine Aminotransferase
AMP: Adenosine monophosphate
AMY: Amylase

ATP: Adenosine triphosphate
AST: Aspartate Aminotransferase
ASA: American Society of Anaesthesiologists
BID: twice daily
BUN: Blood Urinary Nitrogen
cAMP: Cyclic adenosine monophosphate
CBC: Complete Blood Cell
CHF: Congestive Heart FAilure
CKD: Chronic Kidney disease
CO: Carbone Monoxide
CRF: Chronic Renal Failure
CT: Computed Tomography
cTnI: Cardiac Troponine I
dL: decilitre
DLH: Domestic long Hair
DSH: Domestic Short Hair
ECG: Electrocardiogram
FNA: Fine needle aspiration
FT_4: Free Thyroxine
g: gram
GFR: Glomerular Filtration Rate
Gi: Inhibitory G
GI: Gastrointestinal
GLOB: Globulins
Graph: Graphic
Gs: Stimulatory G
Gy: Gray
h: Hour
HCM: Hyperthrophic Cardiomyopathy
K^+: Potassium
Kg: kilogram
KI: Potassium iodine
KIO_3: Potassium iodate
L: Liter
LDH: Lactate Dehydrogenase
L-throxine: Levothyroxine
mCi: millicurie
MCV: Mean Corpuscular Volume
mg: milligram
mm: millimeters
mm^3: cubic millimeter
mmHG: millimeters of mercury
mR: milliroentgen
Na^+: Sodium
NEFAS: (4aR,9aS)-N-ethyl-4,4a,9,9a-tetrahydro-1H-fluoren-4a-amine
ng: Nanogram
Nmol: Nanomol
NSAID: Non-steroidal anti-inflammatory drug
OID: Once daily
PCB: Polychlorinated biphenyls
PCV: Packed Cell Volume
PD: Polydipsia

PLO: pleurolecithin organogel
PLT: platelets
PTH: Parathyroid Hormone
PU: Polyuria
rad: largely obsolete unit of absorbed radiation dose
RBC: Red Blood Cells
rT_3: reverse Triiodothyronine
RVC: Royal Veterinary College
T_2: Diiodothyronine
T_3: Triiodothyronine
T_4: Thyroxine
TBIL: Total bilirubin
TID: thrice-daily
TNG: Toxic Nodular Goitre
TSH: Thyroid Stimulating Hormone
TRH: Thyrotropin Releasing Hormone
TT_3: Total Triiodothyronine
TT_4: Total Thyroxine
SAP: serum alkaline phosphatise
UK: United Kingdom
WBC: white blood cells